

CASE REPORT

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A new case of representational neglect

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Abstract We describe a right-handed female patient who, after a right-hemisphere stroke, showed a florid representational neglect, but no evidence of perceptual neglect. This finding provides further support for the argument that orienting attention to the representational and perceptual spatial domains is subserved by independent neural mechanisms.

Key words Neglect • Representational space • Perceptual space

Introduction

Unilateral spatial neglect is usually defined as the failure to orient to, act upon, and perceive stimuli delivered to the side of the space contralateral to a cerebral lesion. However, neglect may also pertain to the representational domain, as first demonstrated by Bisiach and Luzzati [1]. Although several studies [2-4] confirmed the idea that neglect may affect mental representations, the question whether or not perceptual and representational neglect are two dissociable phenomena is still controversial. Bartolomeo et al. [5] investigated the relationship between perceptual and representational neglect in a large group of right-brain damaged (RBD) and left-brain damaged (LBD) patients. They found several cases of perceptual neglect in absence of representational neglect, but no evidence of representational neglect dissociated from perceptual neglect [5]. However, on a follow-up evaluation carried out eight months post-onset, one of the RBD patients showed a persistent representational neglect, without any reliable signs of perceptual neglect. This evidence suggests that the two forms of spatial impairment may have, at least, different time courses, likely because of independent mechanisms of recovery. This hypothesis may also account for the case described by Guariglia et al. [6]. Indeed, their patient, examined 16 months after a stroke, showed a clear representational neglect, but no signs of perceptual impairment. However, Beschin et al. recently reported a RBD patient who, also in the acute phase after stroke, exhibited a florid representational neglect dissociated from perceptual neglect [7].

Given that a single case does not provide reliable proof for independent cognitive processes, further evidence is necessary to confirm the hypothesis that orienting attention to perceptual and representational space are independent phenomena.

The present report describes a right-handed subject who, 45 days after a right-hemisphere stroke, showed a florid representational neglect, but no evidence of perceptual impairment.

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Case report

C.F., a 61-year-old housewife with a history of atrial fibrillation, suddenly complained of a weakness of the left limbs on 25 May 1997. On hospital admission, neurological signs included left hemiparesis and very mild left somatosensory loss. Visual field was normal on confrontation. No cognitive deficits were recorded. One week later, computed tomography (CT) revealed a large infarct in the right middle cerebral artery distribution, involving the right temporal, parietal and frontal lobes (Fig. 1).

On 17 June 1997, C.F. was transferred to the Rehabilitation Unit to carry out a rehabilitation treatment. She gradually improved in mobility and self-care skills, and one month later was discharged from the hospital. The patient gave an informed consent to the present study.

Neuropsychological assessment

When examined by us, 45 days post-onset, C.F. was well oriented as to time, space and personal information. Neither instability of mood nor depression were present. C.F. showed a complete awareness of her deficit; thus, when questioned about her motor abilities, she promptly reported the presence

of a left paralysis, resulting from a stroke. Spontaneous speech was fluent without any evidence of aphasic impairment. No tendency for verbal perseveration, or confabulation was observed. Visual perception and praxis abilities, assessed as patient's ability to name and use several objects of everyday life, were normal. The patient correctly recognized relatives and people from the hospital staff, showing no evidence of prosopagnosia. No mnemonic deficits were evident. Finally, C.F. scored as a full right-handed subject on Briggs and Nebes's questionnaire [8].

Signs of neglect

The patient's spontaneous behaviour and performance in formal testing failed to show perceptual neglect. C.F. did not exhibit rightward eye, head or trunk rotation, never missed the food on the left side of the plate, and promptly oriented towards people addressing her from the left. In addition, she never omitted her left face and limbs during making-up and dressing procedures, respectively.

According to a partially modified version of the procedure suggested by Bisiach and coworkers [9], personal neglect was formally investigated by asking the patient to touch different parts of her body with the right, unaffected

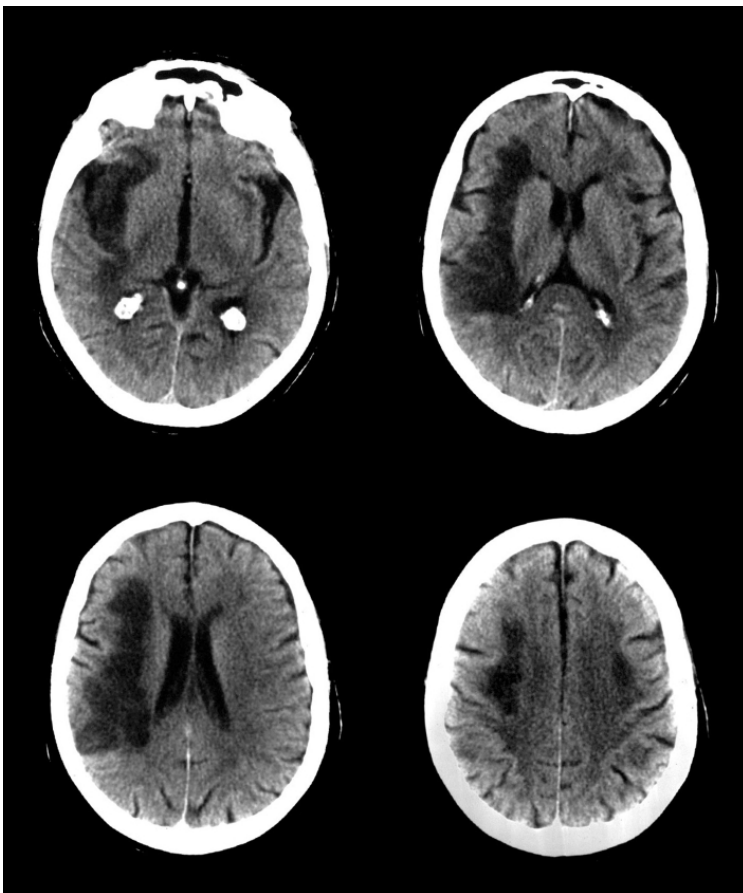


Fig. 1 CT scans, showing C.F.'s lesion. Ischemic areas appear darker as compared with the brain parenchyma. The left hemisphere is represented on the right. The exam was performed at Borgo Trento Hospital, Verona, on 28 May 1997

hand. C.F. promptly and accurately reached all the targets, her left arm and hand included. Moreover, C.F. performed errorlessly in a series of tests widely used for the assessment of visuospatial neglect, namely a cancellation test [10], a sentence reading test [11], and drawing from copy and writing tasks [12].

Representational neglect was investigated by means of the following three tests: (a) drawing a clockface from memory; (b) description of the most famous square in the city (Piazza Brà) from two opposite, imagined viewpoints [1]; and (c) a partially modified version of the o'clock test [13], according to which patient was asked to indicate in which of the two times verbally presented by the examiner, the angle defined by the hands was larger. Forty trials were administered: for 20 of them one hand was along the vertical midline and the other was in the left half of the clockface (left trials; e.g. 7:00 - 11:00); for the remaining 20 trials one hand was along the vertical midline and the other was in the right half of the clockface (right trials; e.g. 5:00 - 5:30).

In the first test (drawing a clockface from memory), C.F. only drew numbers from 12 to 6, thus omitting those from 7 to 11 (Fig. 2). In the second test (describing Piazza Brà from memory), she accurately reported buildings and streets on the right, but omitted those on the left. Finally, in the third test (o'clock test), she performed at chance on left trials (10 hits; accuracy = 50%), but quite properly on the right ones (18 hits; accuracy = 90%).

Smooth finger twitches and light touches to the dorsal surface of the patient's hands served as stimuli to assess visual and tactile extinction, respectively. A random

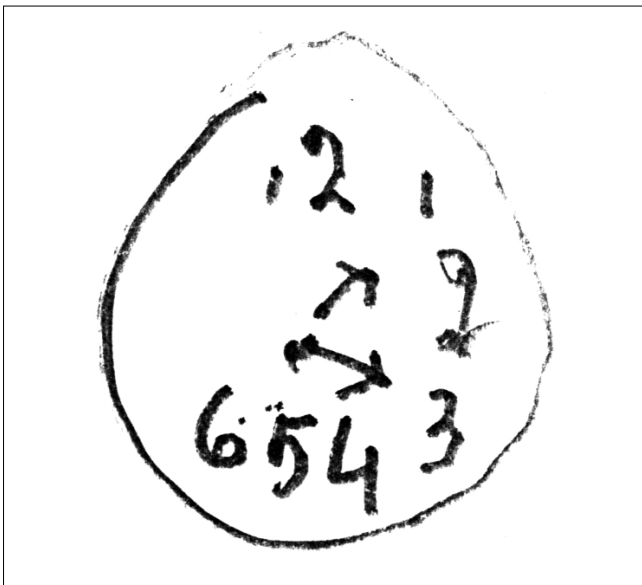


Fig. 2 C.F.'s performance in drawing a clockface from memory. The test was performed at Sacro Cuore Hospital, Negrar (VR), on 1 July 1997

sequence of 40 stimuli was delivered. For 20 trials, stimuli were unilateral (10 trials for each side); for the remaining 20 trials, they were bilateral. C.F. detected all the unilateral stimuli, both visual and tactile. In contrast, under bilateral stimulation conditions, C.F. omitted all the stimuli presented on her left hemispace and detected only 1 of 20 stimuli delivered to the left hand (accuracy = 5%). A corollary observation was that accuracy increased to 100% when C.F. crossed her hands across the body midline, according to the "crossing effect" recently described by Aglioti and coworkers [14].

Discussion

Following a right hemisphere stroke, patient C.F. showed left tactile and visual extinction, a selective left representational neglect, but no evidence of perceptual neglect. This result was confirmed by patient's spontaneous behaviour and performance in formal testing. However, since we examined the patient 45 days post-onset, one might argue that perceptual neglect was present in the very first phase after the stroke and then resolved. Although this possibility cannot be ruled out, it seems unlikely, given that neither patient's relatives nor the hospital staff ever noticed any behavioural evidence of perceptual impairment.

Data in literature indicate that whereas perceptual neglect in absence of representational impairment is a frequent occurrence, the opposite is rather rare [5]. The present case provides further support to the argument that representational and perceptual neglect are independent phenomena, thus suggesting that orienting attention to the representational and the perceptual domains is subserved by different neural mechanisms which can be selectively impaired. Indeed, it seems likely that the incidence of representational neglect has been so far underestimated. A possible explanation for this lack of evidence is that several cases of pure representational impairment might not be detected because of the absence of any behavioural signs.

So far, representational neglect dissociated from perceptual neglect has been reported as a consequence of lesions involving the frontal [6] and the parietal [7] lobes. In patient C.F., lesion involved the temporal, parietal and frontal lobes, thus preventing us from establishing any correlation between the spatial impairment and the site of the lesion. Further investigation is necessary to disclose the anatomical basis of perceptual and representational neglect in support of the double dissociation hypothesis.

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Sommario *Viene descritto il caso di una paziente destrimane che, in seguito ad un insulto cerebrovascolare a carico dell'emisfero destro, ha presentato una forma di negligenza spaziale unilaterale confinata alla sola sfera rappresentazionale, senza alcun coinvolgimento della sfera percettiva. Questo rappresenta un'ulteriore evidenza a favore dell'ipotesi che meccanismi neurali indipendenti sottendano all'orientamento dell'attenzione nello spazio rappresentazionale e percettivo.*

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